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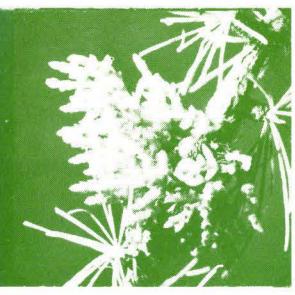

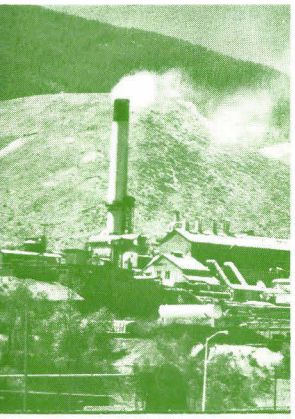

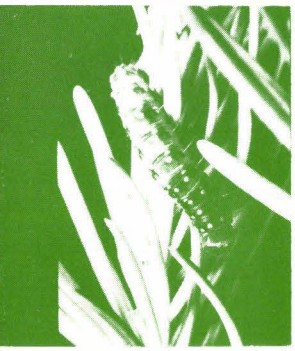

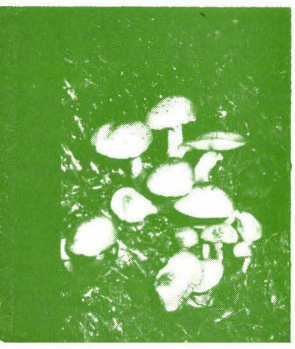

FOREST INSECT & DISEASE MANAGEMENT

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Report No. 79-16 June 1979

AN EVALUATION OF CONE AND SEED INSECTS IN SELECTED SEED PRODUCTION AREAS IN REGION 1

(Progress Report)

by

Jerald E. Dewey and Michael J. Jenkins 1/

ABSTRACT

An evaluation was made in 21 seed production areas and 1 seed orchard in Region 1 to identify the primary insect pests and to assess amount of injury caused. Cones from Douglas-fir, grand fir, western larch, lodgepole pine, ponderosa pine, and western white pine were collected periodically and examined.

The primary insect species observed were western spruce budworm on Douglas-fir, grand fir, and western larch; midges on Douglas-fir, grand fir, western larch, ponderosa pine, and lodgepole pine; coneworms on Douglas-fir, grand fir, western larch, and ponderosa pine; and the Douglas-fir cone moth on Douglas-fir.

INTRODUCTION

As forest management is becoming more intensive in Region 1, greater emphasis is being placed on establishing and utilizing seed production areas (SPA's) for regeneration purposes. Seed

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production areas are superior appearing stands that are usually opened by removing undesirable trees and cultured for optimum seed production. The investment and potential payoff of SPA's are substantial and must be protected.

Many species of insects are known to be damaging to cones and seeds of western conifers (Keen 1958). Numerous studies have documented significant impacts on cone production by a number of insect species (Barnes et al. 1962; Hedlin 1967a; Hedlin 1967b; Fellin and Shearer 1968; Dewey 1970; Hedlin 1973; Kulhavy and Schenk 1973). Entire cone crops can be lost to insects if control measures are not taken. Extent and frequency of insect damage to cones and seeds can vary drastically from year to year as a function of cone crop size, climatic conditions, surrounding pest population densities, and complexes of predators, parasites, and pathogens.

The existing and planned SPA's in Region 1 represent a wide range of tree species, habitat types, elevations, and stand ages and conditions. An equally broad range of insect enemies of cones and seeds can be expected to exist. Much variability in the insect complex can be expected as features change from area to area. In order to be assured of meeting the objective of increased production of superior seed, a management system for each of the major insect pests is needed. The first step toward development of such a system is the identification of the important insect species. Not until this has been accomplished, and their type of damage and life cycles clearly understood, can methods of management be developed.

Fortunately, the biologies of the primary cone and seed insects in the Region are quite well understood. Thus the main task remaining prior to developing management methods is to define the important insect complex on an area and tree species basis.

Because insect populations can fluctuate dramatically from 1 year to another, it is necessary to monitor each SPA 3 or more years to determine what insect species can be expected and the type and amount of injury they may inflict.

This is an interim report describing evaluation methods and results of the first year's effort.

OBJECTIVES

The objectives of this evaluation are:

1. Determine the primary cone- and seed-feeding insects on a host basis, at each existing and presently planned seed production area in the Region.

2. Describe the type, and quantify the amount of injury caused by each insect species.

3. Where possible, correlate extent of cone and seed injury with such factors as habitat type, elevation, stand age, and stocking density.

METHODS

Forty existing and/or planned SPA's and seed orchards were examined in May 1978 to estimate cone crops and identify areas suitable as collection sites (figure 1). Plot data was collected including elevation, habitat type, aspect, slope, tree species managed for, stand age, stand density, and special treatments applied (fertilization, roguing, thinning, etc.). Areas with ample cones were revisited at approximately 3-week intervals from early June through mid-September.

When sufficient cones were available, four trees of each species were marked and sampled throughout the summer. If not enough cones were present to provide a full sample from the four trees, the remaining cones were collected from the nearest cone-bearing trees.

Cones were collected by dividing each sample tree into directional quadrants (north, south, east, and west). The most accessible cones from within or nearest a given quadrant were collected without consideration to cone condition. A different quadrant was assigned each of the four sample trees per area, per species, per collection period.

The cone population was estimated on each sample tree using binoculars and/or a spotting scope, and using Dobbs et al. (1976) method, were defined as very light, light, moderate, or heavy.

When sufficient cones were available, 40 were stored in paper bags clearly marked as to location, date, tree species, tree number, and collector; placed in chest type coolers, and returned to the lab. At the laboratory, one-half (20) of the cones per bag were dissected, and the other half placed in rearing containers to obtain adult insects for identification purposes.

Cones were collected by climbing trees (figure 2) and/or pruning cone-bearing branch tips with a telescopic pole pruner and catch basket attached (figure 3).

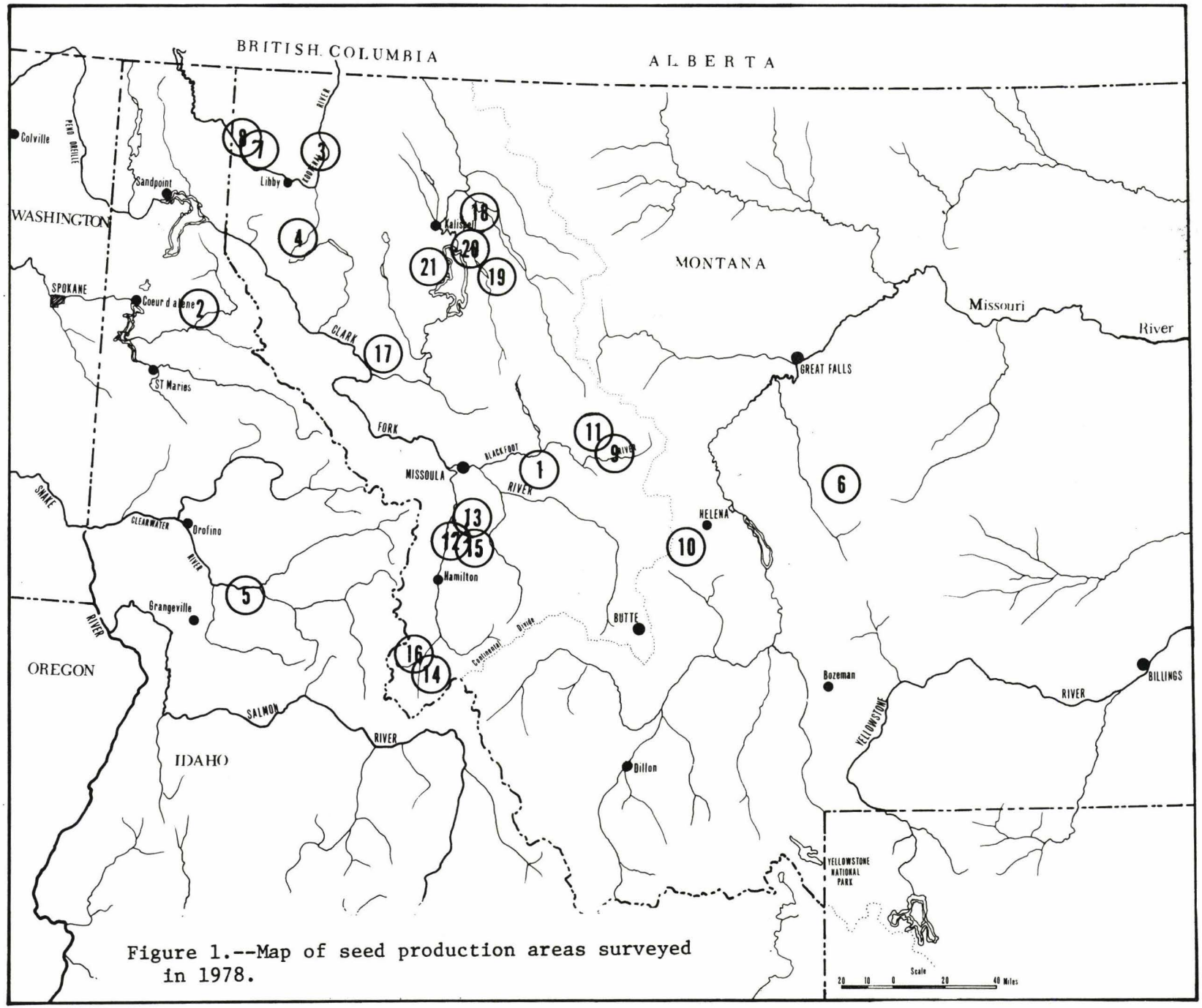

Figure 1.--Map of seed production areas surveyed in 1978.

Figure 2.--Climbing tree to collect cones.

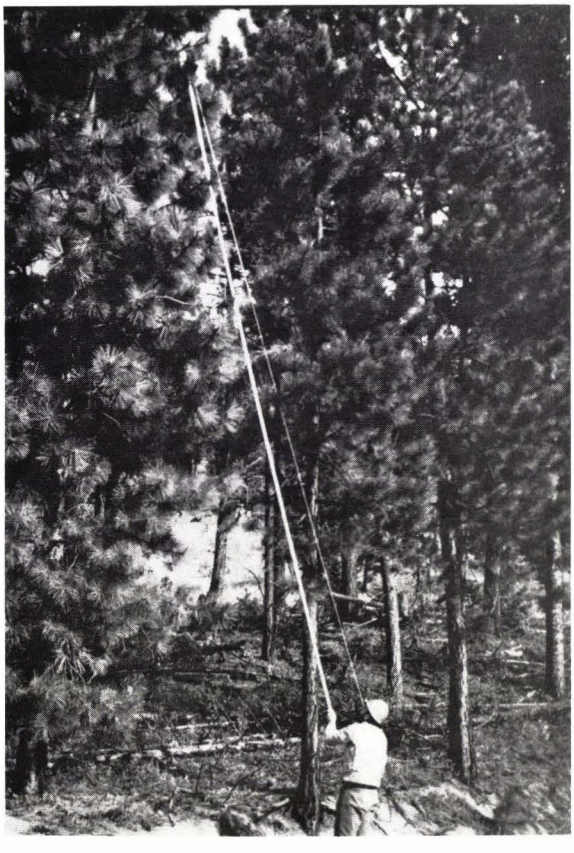

Figure 3.--Using telescopic pole pruner with catch basket to collect cones.

In the lab, cones to be dissected were first examined to estimate amount of injury. Criteria used to assess injury were excessive resin exudation, distorted shape, or evidence of insect feeding. Each cone was given one of the following codes:

Code Number		Percent of cone injured
1	=	0
2	=	1-10
3	=	11-25
4	=	26-50
5	=	51-75
6	=	76-100

Following estimation of injury, cones were dissected and completely examined to determine if insects were present; and, where possible, an identification was made. Insect identifications from the dissections were restricted to the following larvae: western spruce budworm 2/, midges 3/, cone moth 4/, coneworms 5/, seed chalcids 6/, cone maggots 7/, and miscellaneous.

Insects reared to adults were sent to the U.S. National Museum for identification.

RESULTS AND DISCUSSION

Twenty existing or proposed SPA's and one seed orchard, that were examined, had sufficient cones to permit one or more cone collection. The location, stand characteristics, and cone crop size for these SPA's are shown in table 1.

Other areas examined but not sampled due to a shortage of cones include:

Bitterroot NF
- Soda Springs
- Lower Ditch Creek
- Gold Creek
- Eastman Creek
- Big Creek

Clearwater NF
- Jungle Point
- Savage Camp
- Fan Saddle
- Cold Springs

2/ Choristoneura occidentalis Freeman
3/ Contarinia sp. and unknown sp.
4/ Barbara colfaxiana Kearf.
5/ Dioryctria sp.
6/ Megastigmus sp.
7/ Earomyia sp.

Table 1.--Location, stand characteristics, and cone crop size of SPA's sampled

SEED PRODUCTION AREA	LOCATION	SPECIES[1/]	HABITAT TYPE	ELEV. (Feet)	ASPECT	SLOPE (Degrees)	SIZE (Acre)	CONE[2/] CROP SIZE
Bitterroot NF								
Buck Cr.	SW NE 6 T1S R21W	LPP	DF/Vagl/Xete	5,500	NW	15	20	M
Eight Mile Cr.	10 T10N R18W	DF	DF/Caru	5,000	SW	50	320	M
South Ambrose	20 T9N R18W	WL	AF/Mefe	5,000	NW	30	160	VL
Slocum-Claremont	28,32 T9N R18W	LPP	AF/Xete	6,000	NW	10	500	M
Wheeler Cr.	SE 24 T1N R22W	PP		5,000	SE	20	30	M
Flathead NF								
Bond Cr.	NW 19 T25N R17W	DF	DF/Clun		NW	5	7	M
Lid Cr.	NE 17 T29N R18W	WL		4,500	NW	10	200	VL
Mount Cr.	NW 19 T26N R22W	SL		5,000	SW	20	10	VL
Wolf Cr.	NW SW 19 T27N R18W	DF			SW	25	8	M
		PP			SW	25	8	M
Helena NF								
Lincoln Gulch	8 T14N R9W	LPP			SE	5	15	L
Colorado Mt.	26 T9N R5W	LPP	S/Egar	7,000	SE	5	15	M
Cooper's Lake	6 T15N R10W	WL			SW	20	15	VL
Idaho Panhandle NF's								
Kelly Mt.	NW NW 8 T50N R2W	DF	DF/Pamy	3,650	SW	5	10	L
		WWP						L
Sandpoint Seed Orchard	SE SE 21 T57N R2W	WWP		2,086		0	17	H
Kootenai NF								
Coyote Flat	35 T33N R34W	PP	DF/Feid	1,900	S	10	3	M
Bristow Cr.	11 T32N R29W	DF	DF/Caru	2,500	S	20	15	M
Fisher Cr.	4 T26N R30W	LPP	WRC/Ladyfern	3,000	S	5	20	L
Rocky Cr.	SE NE 16 T33N R34W	PP	DF/Fied	2,000	SE	15	20	L
Lewis and Clark NF								
Moose Cr.	SE 25 T13N R7E	LPP						
Lolo NF								
Henry Cr.	SE 26 T20N R25W	DF PP		4,500	SW	15	20	M
Nezperce NF								
Potato Hill	SW NE 29 T32N R6E	GF			N	5	15	H
BLM (Missoula Dist.)								
Union Pk.		DF						

1/ DF = Douglas-fir, LPP = Lodgepole Pine, PP = Ponderosa Pine, WL = Western Larch, ES = Engelmann Spruce, WWP = Western White Pine

2/ From Dobbs, et al. 1976. N = None, VL = Very Light, L = Light, M = Medium, H = Heavy

Gallatin NF
- Battle Ridge

Helena NF
- North Fork

Lolo NF
- C.C. Divide
- Twelve Mile

Though 1978 was considered a "good" cone year throughout the Region, there was much variability in cone crop size among areas and tree species.

The following is a review of our findings on an SPA basis.

BITTERROOT NATIONAL FOREST

Buck Creek.--Cone collections were made in this lodgepole pine area on July 19, August 8, and August 24. Percent of cones with visible insect injury was 7.5, 5.0, and 17.5 for the respective sampling periods. Nearly all damage was caused by a midge, probably Asynapta hopkinsi Felt.

Many midges are required per cone to seriously affect seed development. Our survey indicates that insects had a very minor impact on lodgepole pine cone and seed production. Hence, it is unlikely that measures aimed at controlling insects affecting lodgepole cones in this area will be needed.

Eight Mile Creek.--Douglas-fir cones were collected four times at this site. Extensive insect injury was caused by a number of insect species. By the first collection (July 19), 70 percent of the cones were conspicuously injured. Most of the injury was caused by the western spruce budworm (78.6 percent) and the fir coneworm 8/ (26.7 percent). Some cones were attacked by both insects. These insects are extremely damaging to cones, often causing them to be sloughed prior to cone maturity.

By the second collection (August 10), western spruce budworm had completed its larval stage and was no longer affecting the residual crop. During this collection, 31.3 percent of the cones sampled showed visible insect injury. Eighty percent of this injury was attributed to budworm, though larvae were not present. The primary cone pest present at this time was the Douglas-fir cone moth, which infested 20 percent of the damaged cones.

The third collection was made August 25, at which time 57.5 percent of the sampled cones were insect damaged; 36.9 percent of these by budworm, 37.0 percent by midges 9/, 15.2 percent by the Douglas-fir cone moth, and 8.7 percent by the fir coneworm.

8/ Dioryctria abietivorella Grote
9/ Contarinia oregonensis Foote, and C. washingtonensis Johnson

A final collection was made September 14; and, again, 57.5 percent of the collected cones displayed insect injury symptoms. By this time the cones had matured. Some cones had opened and seeds were being shed. Most insects were gone and no attempt was made to identify which insect species were responsible for the injury.

From this year's survey it is evident that insects will probably continually be an important factor influencing the success of this SPA as a source of Douglas-fir seed. Most of the important Douglas-fir cone and seed-destroying insects are common in this area. Although western spruce budworm is not numerous enough in this area at this time to cause aerially visible defoliation, a large proportion of the cones were destroyed by this insect. Periodically, epidemic budworm populations will develop in this area. Without budworm management nearly 100 percent of the cones will be lost during epidemic years.

South Ambrose Creek.--Cones were collected from this western larch SPA four times. In the initial collection (July 20), 62.5 percent of the collected cones were damaged. Primary pests were western spruce budworm (12 percent of damaged cones) and an unidentified midge (36 percent of damaged cones). Another 14 percent of these cones were damaged by a combination of seed maggots and other lepidopterous larvae.

The second collection was made August 8, and 34.2 percent of the cones were deformed due to insect feeding. Of these, 76.9 percent were midge infested, and the remainder were damaged by a variety of unidentified larvae.

On August 24, 77.5 percent of the collected cones were insect injured. The causal insect was not determined for most of this injury. Midges were present in 9.7 percent of the damaged cones.

A final collection was made September 14. At this time, 35.0 percent of the remaining cones were conspicuously damaged. The insects responsible for this damage were not identified.

The cone crop size in this area was described as very light. Ordinarily, the smaller the cone crop, the higher the percentage of insect-damaged cones. Hence, though a large proportion of the cones were damaged this year, that number may be greatly reduced during years of bumper cone crops.

The most common insect in this area was a midge species; though midges may be present in cones in sufficient numbers to cause cone distortion, they often do not destroy the developing seeds.

Western spruce budworm is often very damaging to young larch cones. Currently budworm populations are too low in this area to cause aerially

visible defoliation to the surrounding fir stands. When budworm populations reach epidemic levels they will result in the loss of most larch cones unless control measures are developed and applied.

Slocum-Claremont.--Collections were made in this lodgepole pine SPA on July 20, August 9, and August 25. As in the other lodgepole areas insect injury was minimal. Percent damage by collection period was 12.5, 7.5, and 7.5. A midge species was the most commonly found insect.

We do not expect insects to be too damaging to lodgepole pine cone production.

Wheeler Creek.--Ponderosa pine cones were collected from this area on August 8 and August 24. Only 7.5 percent of the cones from the first collection were injured. All injury was attributed to an unidentified midge species. The second collection revealed 37.5 percent of the cones injured; 19 percent by a coneworm 10/, 13.3 percent by a midge, and the cause of the remainder was undetermined.

Much of the seed from midge infested cones appeared to develop normally; however, viability may have been affected. Coneworms destroy most of the developing seeds in infested cones.

FLATHEAD NATIONAL FOREST

Bond Creek.--This is an SPA managed for Douglas-fir. Cone collections were made at this site on July 11, August 1, August 22, and September 12. Percent cones visibly deformed were 22.5, 78.6, 55.0, and 17.5 for the respective sampling periods. Western spruce budworm was responsible for most of the injury during the first two sampling periods. After early August, budworm-caused damage ceased, and many of these injured cones had fallen. Midges and coneworms were responsible for most of the injury in the last two collections.

The probable reason for the significant decline in damaged cones in the last collection is that many of the damaged cones had previously been prematurely shed.

This is an area where western spruce budworm is not abundant enough to cause visible defoliation to the Forest; however, this insect still caused appreciable damage to the cone crop. When and if budworm populations become epidemic, direct suppression measures will need to be taken if cone crops are to be protected.

10/ *Dioryctria auranticella* Grote

Lid Creek.--Western larch cones were collected from the Lid Creek SPA on July 12, August 2, August 23, and September 13. Insect-caused injury was very low for the first two collections; i.e., 4.9 and 0 percents respectively. Cones from the third collection showed a moderate (47.5 percent) amount of injury, most of which was caused by an unidentified midge. Fifteen percent of the cones from the final collection were damaged.

These are quite low damage levels, especially considering this area had a very small number of cones produced. Ordinarily, the smaller the cone crop, the higher the percent of insect damage. Quite likely, during years of good cone production, insect damage will be slight enough that no insect management will be required.

Mount Creek.--Two collections (August 22 and September 11) were made from this western larch SPA. At both collections, 20.5 percent of the cones were visibly deformed. The primary causal agent was an unidentified midge. The cone crop was very light in this area; hence the amount of injury is almost insignificant.

Wolf Creek.--This SPA is managed for both ponderosa pine and Douglas-fir. Collections were made from both tree species on July 11, August 1, and August 22. Up to 50 percent of ponderosa pine cones were attacked; a coneworm was the most common insect (38.1 percent). Unidentified miscellaneous insects accounted for the remainder of the losses. Douglas-fir cones were not severely infested (15 percent). Spruce budworm and a scale midge were responsible for these losses.

HELENA NATIONAL FOREST

Colorado Mountain.--Collections were made from this lodgepole pine area on June 29, July 20, August 9, and September 7. Insect injuries were 2.5, 37.5, 25.0, and 0 percents respectively. The injury percentages obtained on the second and third collections were the highest for any lodgepole pine SPA in the Region. The insect causing this injury was not identified.

Cooper's Lake.--Collections were made from this western larch SPA on July 21, August 18, and September 8 with percent visible deformity being 50, 57.5, and 2.5 respectively. The fir coneworm was responsible for 13 percent of the damage found in the August 18 collection. The remainder of the injury was caused by miscellaneous insects.

Lincoln Gulch.--This lodgepole pine SPA was consistent with findings from most other lodgepole pine areas in the Region. Damage found on any of the four collections did not exceed 5 percent. The insect causing this damage was not identified.

IDAHO PANHANDLE NATIONAL FORESTS

Kelly Mountain.--This is a multispecies SPA being managed for western white pine, western larch, grand fir, and Douglas-fir seed production. In 1978, collections were made from Douglas-fir only on July 16, August 8, and August 30. Percent visible cone deformity on these dates were 31.3, 57.5, and 31.3. Insects attacking cones obtained on the first collection were spruce budworm (60 percent), fir coneworm (32 percent), and 12 percent resulting from miscellaneous insects. On collection 2, 52.2 percent of the damage resulted from budworm, 36.9 percent by midges, 17.4 percent by cone moths, and 8.7 percent by coneworms. Insect damage to the final collection resulted from budworm (4.0 percent), midges (40 percent), and the fir coneworm (4.0 percent).

Sandpoint Seed Orchard.--This orchard is a grafted, rust-resistant western white pine seed orchard established in 1961 to provide seed for interim planting needs and establishment of additional seed orchards in the Region. In recent years, large numbers of cones have been destroyed by the mountain pine cone beetle 11/. In 1977, over 80 percent of the cones were attacked. Sixty-five percent of a heavy 1978 cone crop was also lost to the beetle.

The Pacific Southwest Forest and Range Experiment Station is currently studying the biology of this beetle and experimenting with insecticides as a possible control measure. Production of adequate amounts of rust-resistant western white pine seed for Regional planting is dependent upon acceptable methods for control of the mountain pine cone beetle.

Bristow Creek.--Collections were made from this Douglas-fir SPA on four occasions. Collection 1 (June 28) had 11.3 percent visibly deformed cones resulting from spruce budworm (55.6 percent) and fir coneworm (44.4 percent) activity. Collection 2 (July 27) had a 30 percent insect attack level. The damage was caused by budworm (33.3 percent) and midges (66.7 percent). Collections 3 (August 15) and 4 (September 7) had 48.8 and 54.4 percent of the cones visibly deformed. Most of this was the result of previous budworm activity, although collection 3 showed cone midge (25.6 percent), scale midge (23.1 percent), cone moth (5.1 percent), and coneworm (5.1 percent) activity. Low level (7.0 percent) scale midge activity was also observed on cones from collection 4.

Coyote Flat.--Coyote Flat SPA is managed for ponderosa pine. The 1979 cone crop was rated medium; i.e., many cones on 25-50 percent of the seed trees. Cones were collected on June 28 and July 27, with 63.3 and 32.5 percent of the cones visibly deformed on the respective dates. All damaged cones from the first collection and 92.3 percent of those from the second collection were damaged by coneworms. An unidentified midge was found in 15.4 percent of the damaged cones from the second collection.

11/ *Conophthorus monticolae* Hopkins

Fisher Creek.--Lodgepole pine cones were collected from this SPA on June 27, July 26, August 14, and September 6. Though it was a light cone crop, very little insect injury was observed per collection period; i.e., 3.3, 2.5, 0.0, and 0.0 percent.

Rocky Creek.--The only collection made from this ponderosa pine area was on August 16. Of the 40 cones examined only 2 (5.0 percent) were insect damaged. A coneworm was responsible for this damage.

LEWIS AND CLARK NATIONAL FOREST

Moose Creek.--Cone collections were made from this lodgepole pine SPA on June 28, July 19, August 10, and September 6. Minimal injury was observed; i.e., 0.0, 15.0, 2.5, and 0.0 percent per collection period. The damage was caused by miscellaneous unidentified insects.

LOLO NATIONAL FOREST

Henry Creek.--This area is managed for Douglas-fir, western larch, and ponderosa pine seed production. Douglas-fir cones were collected July 13; western larch and ponderosa pine cones were collected July 13 and August 31.

Ninety-five percent of the Douglas-fir cones collected were visibly damaged. All injury was attributed to western spruce budworm. Insufficient cones were present for additional collections.

From the first larch collection we found 76.7 percent of the cones deformed due to insects. Though the causal agent was unidentified, we suspect most of the damage to be the result of western spruce budworm. In the second collection, we found 42.5 percent of the cones damaged. Midges were mainly responsible. The cause of the remainder of the injury was not determined.

Primary pests of ponderosa pine cones collected in this SPA were coneworms and an unidentified midge. Thirty-nine percent of the cones from the first collection were damaged. More than 68 percent of this injury was caused by coneworms; the cause of the remainder was not identified. By the second collection, 60.0 percent of the cones were injured by coneworms (62.5 percent) and midges (16.7 percent).

NEZPERCE NATIONAL FOREST

Potato Hill.--Grand fir cones were collected from this SPA on July 12, August 2, and August 24. The percentages of visibly deformed cones for the respective collection periods were 30.0, 50.0, and 32.5. The primary pest problem was the fir coneworm which was important from each collection. An unidentified midge was responsible for 5.0 and 7.7 percent of

the injury on the second and third collections. The cause of much of the injury from the first collection was not determined.

BUREAU OF LAND MANAGEMENT

Union Peak.--Collections of Douglas-fir cones were made from this area July 21 and August 17. Percentages of visibly deformed cones were 56.3 and 62.8 respectively for the collection periods. All injury of cones from the first collection was attributed to western spruce budworm, and 93.9 percent of the injured cones from the second collection were the result of budworm.

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Appendix 1

Adult Insects Reared from Caged Cones*

Douglas-fir

LEPIDOPTERA
- Tortricidae:
  - *Choristoneura occidentalis* Freeman
- Pyralidae:
  - *Dioryctria abietivorella* Grote
  - *Dioryctria* sp. (looks like *ponderosae* Dyar)
- Olethreutidae: (No specialist available)

DIPTERA
- Cecidomyiidae
  - *Asynapta hopkinsi* Felt

HYMENOPTERA
- Torymidae:
  - *Megastigmus spermatrophus* Wachtl
  - *Megastigmus* sp.
  - *Torymus* sp.
- Braconidae:
  - *Bracon* sp.
  - *Apanteles* sp.
- Ichneumonoidea:
  - *Campoplex conocola* Rohwer
  - *Itoplectis quadricingulata* Provancher
  - *Exeristes comstockii* Cresson
- Mymaridae;
  - *Anagrus* sp.
- Trichogrammatidae:
  - *Trichogramma* sp.
- Eulophidae:
  - *Tetrastichus* sp.

PSOCOPTERA
- Lachesillidae:
  - *Lachesilla pacifica* Chapman

*All insects sent to U.S. National Museum for identification.

Grand fir

LEPIDOPTERA
- Tortricidae:
  - Choristoneura occidentalis Freeman
- Pyralidae:
  - Dioryctria abietivorella Grote

HYMENOPTERA :
- Mymaridae:
  - Polynema sp.

Western Larch

LEPIDOPTERA
- Tortricidae:
  - Choristoneura occidentalis Freeman

HYMENOPTERA:
- Eulophidae:
  - Elachertus sp.
  - Tetrastichus sp.
  - Hysopus sp.
  - Aprostocetus sp.
- Braconidae:
  - Apanteles sp. probably fumiferana Viereck

HEMIPTERA
- Anthocoridae:
  - Tetraphleps feratis (D. and H.)

Ponderosa Pine

LEPIDOPTERA
- Pyralidae:
  - Dioryctria auranticella Grote
  - Dioryctria abietivorella Grote

DIPTERA
- Cecidomyiidae:
  - Asynapta hopkinsi Felt
  - Cecidomyia resinicoloides Williams
  - Cecidomyia sp.
  - Lestodiplosis taxiconis Foote
  - Lestodiplosis sp.
- Chloropidae:
  - Hapleginella conicola Green

Ponderosa Pine (con.)

HYMENOPTERA
- Braconidae:
  - *Bracon rhyacioniae* Muesebeck
  - *Bracon* sp.
  - *Apanteles* sp.
- Ichneumonidae:
  - *Trichomma maceratum* Cresson
- Eulophidae
  - *Tetrastichus* sp.
- Pteromalidae: (genus unknown)

NEUROPTERA
- Coniopterygidae:
  - *Aleuropteryx* sp.

COLLEMBOLA
- Entomobryidae:
  - *Entomobrya nivalis* Linnaeus

Lodgepole Pine

LEPIDOPTERA
- Gelechiidae: (no specialist)

DIPTERA
- Cecidomyiidae:
  - *Asynapta hopkinsi* Felt
- Chamaemyiidae:
  - *Leucopsis* (*Neoleucopis*) sp. apparently undescribed

HYMENOPTERA
- Torymidae:
  - *Megastigmus atedius montana* Milliron
- Mymaridae:
  - *Anagrus* sp.
  - *Polynema* sp.
- Eulophidae:
  - Tetrastichus sp.
- Scelionidae:
  - *Telenomus* sp.

Western White Pine

COLEOPTERA
- Scolytidae:
  - *Conophthorus monticolae* Hopkins